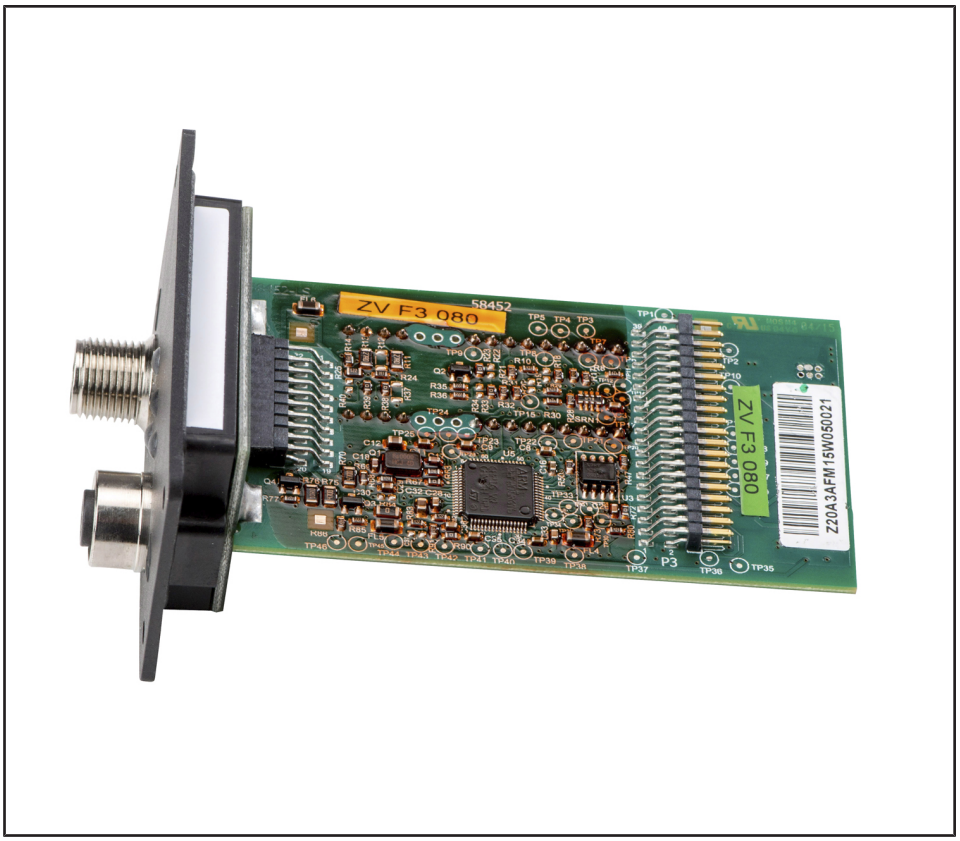
Field Bus Module

Profibus module

PumpDrive 2

Supplementary Operating Manual



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Supplementary Operating Manual Profibus module

Original operating manual

Contents

1 Supplementary Operating Manual

1.1 General

This supplementary operating manual accompanies the installation/operating manual. All information contained in the installation/operating manual must be observed.

Table 1: Relevant operating manuals

Type series	Reference number of the operating/installation manual
PumpDrive 2	4074.81

1.2 Function

The Profibus field bus module serves to connect PumpDrive 2 to a Profibus network. A Profibus module is required for monitoring and open-loop or closed-loop control purposes for each frequency inverter in single-pump configuration or multiple pump configuration.

Interface

The Profibus module is equipped with a Profibus interface with Profibus DP protocol in accordance with the "Profile for Intelligent Pumps" version 1.0 specification. Configuration is done via frequency inverter parameters.

Communication protocol	Profibus DP
Bus terminator	External
Interface	EIA-485 (RS485)
Transmission rate	Automatic, 9600-12 Mbit/s
Device type	Slave

For information on Profibus and downloads for PROFIBUS DP and the "Profile for Intelligent Pumps" please go to www.Profibus.com.

For further accessories for the Profibus module, such as M12 connectors and terminating resistors please refer to the type series booklet.

GSD file

The characteristic communication configuration data of the frequency inverter, such as the number of input signals and output signals, diagnosis messages, etc. are described in an electronic general station description (GSD) file.

The GSD file can be read by a Profibus configuration tool, which is then used to configure the Profibus Master. The GSD file is a PROFIBUS DP standard text file, available for download from the KSB website.

1.3 Field bus module connections

The field bus modules are plug-in modules.

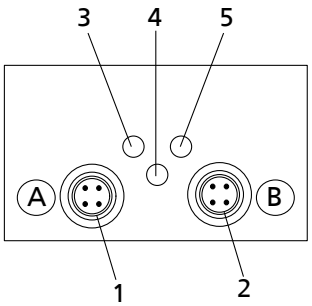

Fig. 1: Field bus module

Table 2: Field bus module

Position	Component	Description
1	M12 connector A	B-coded
2	M12 socket B	B-coded
3	Amber LED signal lamp	Device-internal bus communication OK (heartbeat detected)
4	Green LED signal lamp	Communication on field bus side active/possible
5	Red LED signal lamp	Profibus fault or communication error

- Can be retrofitted
- Internal T-connector (bus looped through); uninterruptible even in the event of a frequency inverter power failure
- Connector for self -assembly

1.4 Installing the field bus module

The field bus module can be fitted in an available slot of the frequency inverter.

Blind cover

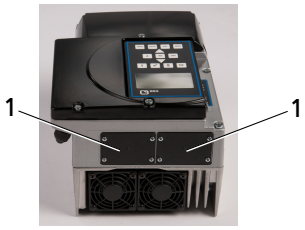

Fig. 2: Blind cover

1	Blind cover

1. Unscrew the cross recessed head screws in the blind cover.
2. Remove the blind cover.

Field bus module

1. Carefully insert the field bus module into the open slot. The plug-in module is guided on rails until it engages in the contact.

Fig. 3: Inserting the field bus module

Fig. 4: Securing the field bus module

2. Secure the field bus module using the 4 cross recessed head screws. IP55 enclosure protection is not provided until the screws have been tightened.

CAUTION

Incorrect assembly

Impairment of protection provided by the enclosure (protection may be compromised)!

▷ Cover unused M12 connections with a cap (included in the scope of supply).

1.5 Connecting the field bus module

For connecting the field bus module observe the installation guide of the Profibus user organisation (PNO) (download from "http://www.profibus.com/download/installation-guide/"). Pay particular attention to the following:

- Before the bus connection is established among the nodes, potential equalisation must have been implemented and checked.
- For high-frequency shielding, use shielded cables and assemble according to EMC requirements.
- A minimum distance of 0.3 metres is recommended between such cables and other electric conductors.
- Do not use the bus cable to make any further connections in addition to the field bus module (for example, 230 V alert and 24 V start).
- A cable specified for the field bus module must be used as the connecting cable.

CAUTION

Incorrect installation

Damage to the field bus module!

▷ Never supply power to the field bus module via the M12 connections.

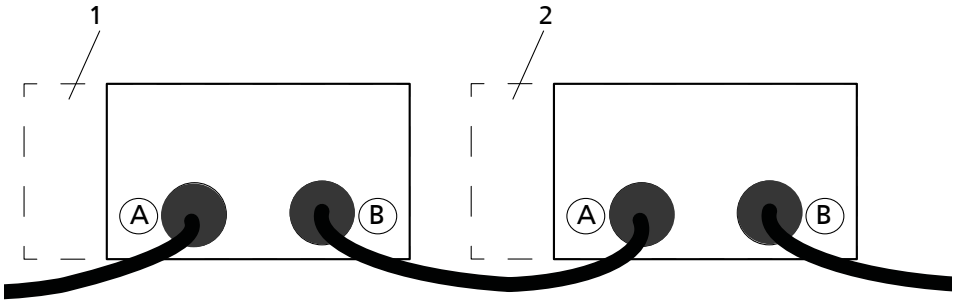

Fig. 5: Connecting the field bus module

Table 3: Connecting the field bus module

Item	Device	M12 connector
1	Frequency inverter 1	M12 connector A: Coming M12 socket B: Going
2	Frequency inverter 2	M12 connector A: Coming M12 socket B: Going

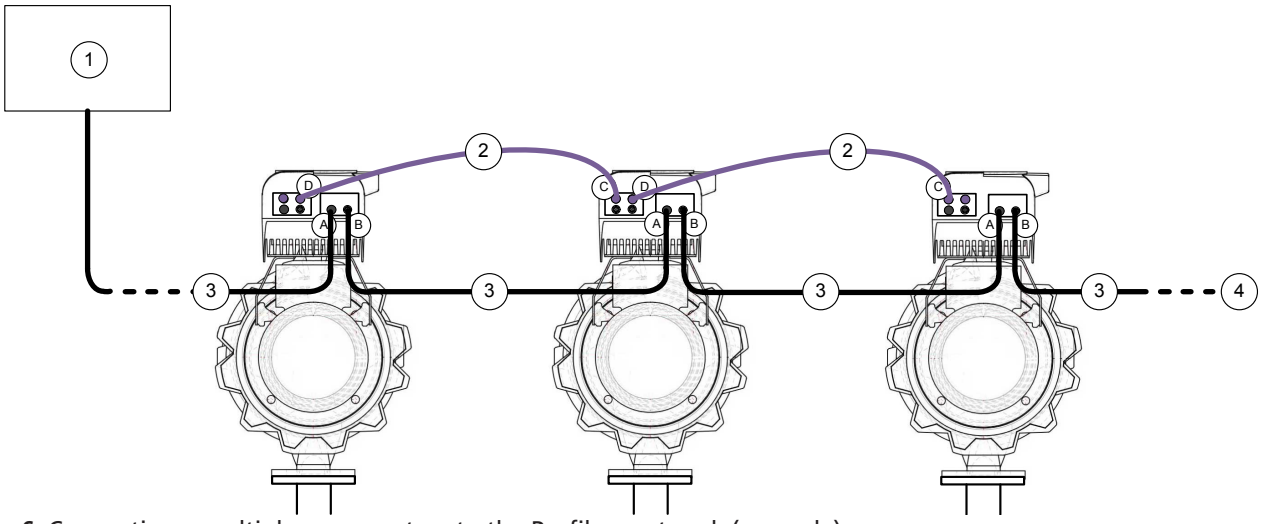

Fig. 6: Connecting a multiple pump system to the Profibus network (example)

1	Profibus Master
2	M12 cable for multiple pump configuration
3	M12 cable for Profibus
4	Further Profibus nodes

Fig. 7: Pin assignment: a) Contact arrangement of M12 connector, b) Contact arrangement of M12 socket

Table 4: Pin assignment

Pin	Core colour code of Profibus cable	Assignment of M12 connector/ M12 socket (B-coding)
1	-	VP (+5 V output)
2	Green	A
3	-	GND
4	Red	B
5	-	Shielding
Thread	Shielding	Shielding

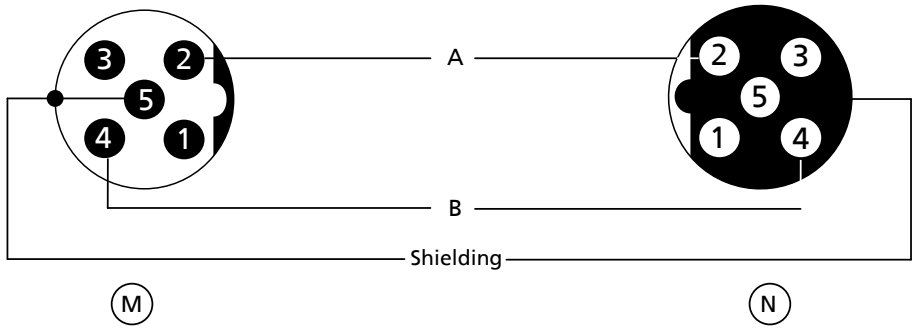

Fig. 8: User-configured cable

Ⓜ	M12 socket	Ⓝ	M12 connector

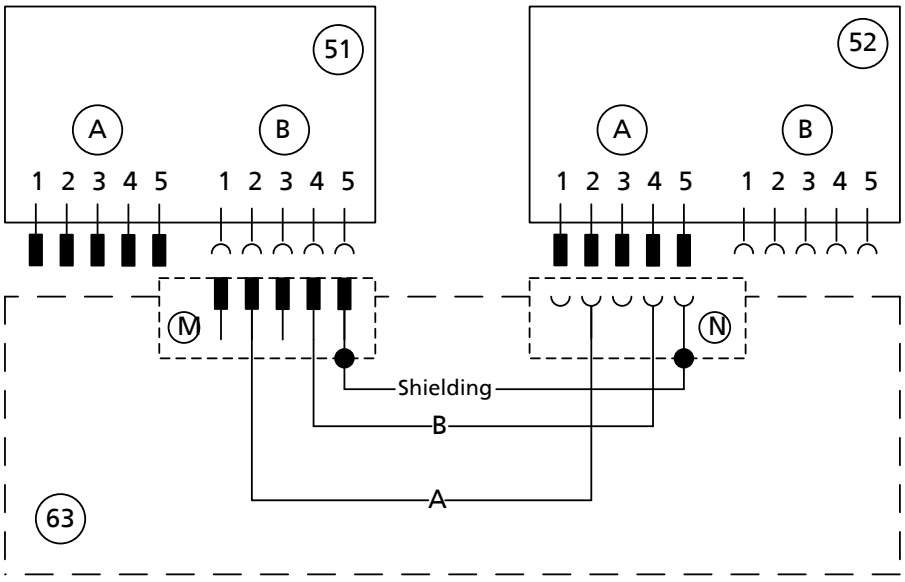

Fig. 9: Wiring diagram

Bus terminator The terminating resistors must conform to the following standard: Profibus standard DP DIN 19245, part 3, section 6.3.

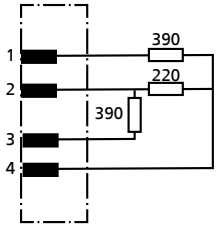

Fig. 10: Bus terminating resistor M12

The field bus terminating resistor can be plugged directly into the M12 socket. Bus polarisation does not take place if the field bus module is de-energised. If the bus terminator is to be independent of the field bus module power supply, it must be implemented externally using an active bus terminator.

NOTE

The frequency inverter is reset when a field bus module is replaced or retrofitted. Menu 3-12 for setting the parameters of the field bus module is then enabled in the control panel.

1.6 Setting the parameters of the field bus module

Field bus control must be activated in the frequency inverter when using the field bus module.

Settings for the Profibus Slave address and the control point are made at the control panel of the frequency inverter.

Table 5: Profibus module parameters

Parameter	Description	Possible settings	Factory setting
3-12-1-1	Profibus slave address *Profibus slave address of the system*	1 - 126	126
3-12-1-2	Number of pump *Unique assignment of the pump in multiple pump configuration*	1 - 6	1

Parameter	Description	Possible settings	Factory setting
3-12-1-3	Cycle time, setpoint/control value *Time delay before the message (warning or alert) is triggered. In a redundant system, only a warning is output as the auxiliary master can assume the function. Only if the setpoint/ control value also fails at the auxiliary master is the alert output, which then triggers the specified response to setpoint/control value failure.*	0.0...10.0	5
3-12-1-4	Cycle time, actual value *Time delay before the message (warning or alert) is triggered. In a redundant system, only a warning is output as the auxiliary master can assume the function. Only if the actual value also fails at the auxiliary master is the alert output, which then triggers the specified response to actual value failure.*	0.0...10.0	1

NOTE

If the field bus is only used for monitoring purposes, the Control Point parameter *(3-6-2)* is set to Local.

NOTE

If the cycle times of parameters *3-12-1-3* and *3-12-1-4* are set to 0 seconds, the monitoring function for each of these parameters is disabled.

1.7 Frequency inverter operation with Profibus module

The function and the commissioning procedure described below for the frequency inverter are based on the device profile and communication profile "Profile for Intelligent Pumps Version 1.0 November 2007" (PIP), edition for centrifugal pumps ("Rotodynamic pump"), issued by the Profibus user organisation (PNO).

Profibus for PumpDrive 2 is defined as a DP Slave of device type "Drive" and can be addressed by a class 1 or class 2 DP Master.

The Profibus implementation supports the cyclic exchange of I/O data as part of the MS0 communication relationship and the acyclic services Read/Write (PI function blocks RDREC and WRREC) as part of the MS1 communication relationship.

1.7.1 Addressing the parameters defined in the PIP for access via MS1

Table 6: Description of column titles

Column title	Description
Functional element ID	ID of the functional elements defined in the PIP for centrifugal pumps (rotodynamic pumps)
Functional element	Name of the functional element defined in the PIP for centrifugal pumps (rotodynamic pumps)
Slot, Index	Address information of the functional elements and their parameters for access via MS1 communication protocol
Parameter name	Parameter name defined in the PIP
Rel. index	Address index of the parameter within the functional element
Access	Supported access to the parameter
Data type	Data type of the parameter
Size	Parameter size in bytes
Description	Parameter description to PIP
KSB menu number, Value range, Value (example)	Mapping to functions by indicating the corresponding menu number (if available) and the valid value range for the parameters

The operating values are indicated in the unit shown under Values. It corresponds with the four-digit number code to DIN IEC 61158 under VALUE_UNIT.

The operating values are indicated in the unit shown under Values. It corresponds with the four-digit number code to DIN IEC 61158 under "VALUE_UNIT".

Table 7: Addressing the parameters defined in the PIP for Profibus interface

ID functional element	Functional element	Slot	Index	Parameter name	Rel Index	Access (r: read, w: write)	Data type	Size [byte]	Description	KSB menu number	Value range	Value (example)	Parameter index
2	PhysicalBlock	0	17	DEVICE_ TYPE	1	r	VisibleString	20	Device name	-	PumpDrive PumpDrive ECO	PumpDrive	0
			19	DIAGNOSIS	3	r	OctetString	4	Diagnosis event in the corresponding component	-	0: No diagnosis event 1: Diagnosis event available	00 00 00 00	1
			20	DIAGNOSIS_MASK	4	r	OctetString	4		-		00 00 00 FF	2
			21	DIAGNOSIS_EXT_HARDWARE	5	r	OctetString	2		-		00 00	3
			22	DIAGNOSIS_EXT_SOFTWARE	6	r	OctetString	2		-		00 00	4

ID functional element	Functional element	Slot	Index	Parameter name	Rel Index	Access (r: read, w: write)	Data type	Size [byte]	Description	KSB menu number	Value range	Value (example)	Parameter index
2	PhysicalBlock	0	23	DIAGNOSIS_EXT_MECHANICS	7	r	OctetString	3	Diagnosis event in the corresponding component	-	0: No diagnosis event 1: Diagnosis event available	00 00 00	5
			24	DIAGNOSIS_EXT_ELECTRICS	8	r	OctetString	3		-		00 00 00	6
			25	DIAGNOSIS_EXT_PROC_LIQUID	9	r	OctetString	2		-		00 00	7
			26	DIAGNOSIS_EXT_PROC_VACUUM	10	r	OctetString	2		-		00 00	8
			27	DIAGNOSIS_EXT_OPERATION	11	r	OctetString	5		-		00 00 00 00 00	9
			28	DIAGNOSIS_EXT_AUX_DEVICE	12	r	OctetString	5		-		00 00 00 00 00	10
1	GenericPump	2	17	PUMP_TYPE_ID	1	r	Unsigned8	1	Pump type (ID)	-	3 to PIP specification	3	11
			18	PUMP_TYPE_VERS	2	r	Unsigned8	1		-	1 to PIP specification	1	12
			19	ON_OFF	3	rw	Boolean	1	System start / stop	1-3-1	FALSE: Off (stop) TRUE: On (start)	FALSE	13
			20	FAULT	4	r	Boolean	1	Status indication: Active alerts	-	FALSE: No alert TRUE: Active pump alert or system alert	FALSE	14
			21	RESET_FAULT	5	rw	Boolean	1	Reset messages	-	FALSE: No reset activated TRUE: Reset activated	FALSE	15
			22	REMOTE_ACCESS_REQUEST	6	rw	Boolean	1	Remote control point access request	3-6-2	FALSE: No remote request (local) TRUE: Remote request (field bus)	TRUE	16
			23	ACCESS_MODE	7	rw	Unsigned8	1	Access to control point and actual value (remote or local)	3-6-2, 3-6-3	1: Control point, local / Actual value source, local 2: Control point, field bus / Actual value source, local 129: Control point, local / Actual value source, field bus 130: Control point, field bus / Actual value source, field bus	130	17

ID functional element	Functional element	Slot	Index	Parameter name	Rel Index	Access (r: read, w: write)	Data type	Size [byte]	Description	KSB menu number	Value range	Value (example)	Parameter index
3	PumpActuation	3	17	SETPOINT	1	rw	Float32	4	Setpoint (closed-loop control) / Control value (open-loop control)	1-3-2, 1-3-3	0-100 % of the value range defined for the process variable	0	18
			19	SETPOINT_UNIT	3	r	Unsigned16	2		-	%	1342	19
			23	FEEDBACK	7	rw	Float32	4	Actual value (closed-loop control)	1-2-1, 1-2-3-1	0-100 % of the value range defined for the process variable	0	20
			25	FEEDBACK_UNIT	9	rw	Unsigned16	2		-	%	1342	21
			28	OPERATION_MODE	12	rw	Unsigned8	1	Operating mode	1-3-8	128: Off 129: Manual mode 130: Automatic mode	130	22
			29	CB_OPERATION_MODE	13	r	Unsigned8	1	Status: operating mode	1-3-8	See: Operating mode	130	23
			31	CONTROL_MODE	15	rw	Unsigned8	1	Type of control	3-6-1	128: Off (open-loop control) 129: Discharge pressure 130: Suction pressure 131: Differential pressure 132: Differential pressure (sensorless) 133: Flow rate 134: Flow rate (sensorless) 135: Temperature (cooling) 136:Temperature (heating) 137: Suction-side level 138: Discharge-side level	128	24
			32	CB_CONTROL_MODE	16	r	Unsigned8	1	Status: type of control	3-6-1	See: Type of control	128	25

ID functional element	Functional element	Slot	Index	Parameter name	Rel Index	Access (r: read, w: write)	Data type	Size [byte]	Description	KSB menu number	Value range	Value (example)	Parameter index
4	MultiPump	4	18	PUMP_ROLE	2	r	Unsigned8	1	Role in multiple pump system	3-7-1	0: Slave (auxiliary control device) 1: Master (active master control device) 2: Slave and auxiliary master (redundant master control device)	1	26
			19	OPERATION_MODE	3	r	Unsigned8	1	Single-pump/ multiple-pump operating mode	-	0: Stand alone mode (SPO) 3: Mixed redundancy and addition operation mode (MPO)	0	27
			20	NUMBER_OF_PUMPS	4	r	Unsigned8	1	Number of pumps installed	-	1...6	1	28
			21	PUMP_COLLECTIVE_IDS	5	r	Unsigned8	1	-	-	0	0	29
			22	MAX_NUM_PUMP_OPERATION	6	rw	Unsigned8	1	Maximum number of pumps running	3-7-2	1...6	1	30
			24	EXCHANGE_EVENT	8	rw	Boolean	1	Immediate pump changeover	1-3-5	FALSE: No pump changeover requested TRUE: Pump changeover requested	FALSE	31
			25	EXCHANGE_MODE	9	rw	Unsigned8	1	Automatic pump changeover	3-7-4-1	1: Deactivated 2: Pump changeover after defined runtime or at specific time of day after defined runtime	1	32
			26	EXCHANGE_TIME	10	rw	TimeOfDay	6	Pump changeover time	3-7-4-3	Time of day in ms starting at 0:00:00	49500000 ms	33
			27	EXCHANGE_TIMEDIFFERENCE	11	rw	TimeDifference4	4	Pump runtime	3-7-4-2	Specification of time interval in ms	14400000 ms	34
5	PIDControl	5	28	KP	12	rw	Float32	4	Proportional constant	3-6-4-2	0.01..100.00	1	35
			29	TI	13	rw	TimeDifference4	4	Integral time (integral constant)	3-6-4-3	0.1..9999.9 ms	200 ms	36

ID functional element	Functional element	Slot	Index	Parameter name	Rel Index	Access (r: read, w: write)	Data type	Size [byte]	Description	KSB menu number	Value range	Value (example)	Parameter index
5	PIDControl	5	30	TD	14	rw	TimeDifference4	4	Rate time (differential constant)	3-6-4-4	0.00 100.00 ms	0 ms	37
6	StandBy	6	17	VALUE	1	r	Boolean	1	Status: operational availability	-	FALSE: Not on stand-by TRUE: On stand-by	TRUE	38
7	PumpActivation	7	17	VALUE	1	r	Boolean	1	Status: automatic mode	1-3-8	FALSE: Not in automatic mode TRUE: In automatic mode	TRUE	39
8	PumpOperation	8	17	VALUE	1	r	Boolean	1	Status: operation	-	FALSE: Pump not running TRUE: Pump running	FALSE	40
10	PumpSpeedMax	9	17	VALUE	1	r	Boolean	1	Operation at maximum speed	-	FALSE: Pump does not run at maximum motor speed TRUE: Pump runs at maximum motor speed 3-2-2-2	FALSE	41
11	PumpSpeedMin	10	17	VALUE	1	r	Boolean	1	Operation at minimum speed	-	FALSE: Pump does not run at minimum motor speed TRUE: Pump runs at minimum motor speed 3-2-21	FALSE	42
15	PumpKick	11	17	VALUE	1	rw	Boolean	1	Immediate functional check run	1-3-6	FALSE: No functional check run requested TRUE: Immediate functional check run requested	FALSE	43
19	InletPressure	12	17	VALUE	1	r	Float32	4	Suction pressure	1-2-3-2	-	0	44
			18	VALUE_UNIT	2	r	Unsigned16	2		-	bar	1137	45
20	OutletPressure	13	17	VALUE	1	r	Float32	4	Discharge pressure	1-2-3-3	-	0	46
			18	VALUE_UNIT	2	r	Unsigned16	2		-	bar	1137	47
22	DiffPressure	14	17	VALUE	1	r	Float32	4	Differential pressure	1-2-3-4	-	-1	48
			18	VALUE_UNIT	2	r	Unsigned16	2		-	bar	1137	49
24	Head	15	17	VALUE	1	r	Float32	4	Head	1-2-3-9		0	50
			18	VALUE_UNIT	2	r	Unsigned16	2		-	m	1010	51
25	VolumeFlow	16	17	VALUE	1	r	Float32	4	Flow rate	1-2-3-5	-	0	52

ID functional element	Functional element	Slot	Index	Parameter name	Rel Index	Access (r: read, w: write)	Data type	Size [byte]	Description	KSB menu number	Value range	Value (example)	Parameter index
25	VolumeFlow	16	18	VALUE_UNIT	2	r	Unsigned16	2	-	-	m^3/h	1349	53
29	FlowVelocity	17	17	VALUE	1	r	Float32	4	Flow velocity of fluid handled	1-2-3-8	-	0	54
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	m/s	1061	55
30	Level	18	17	VALUE	1	r	Float32	4	Level	1-2-3-6	-	0	56
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	m	1010	57
31	Speed	19	17	VALUE	1	r	Float32	4	Speed	1-2-1-1	-	0	58
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	rpm	1085	59
32	Frequency	20	17	VALUE	1	r	Float32	4	Output frequency	1-2-1-7	-	0	60
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	Hz	1077	61
33	Torque	21	17	VALUE	1	r	Float32	4	Motor torque	1-2-1-11	-	0	62
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	Nm	1136	63
34	PumpLiquidTemp	22	17	VALUE	1	r	Float32	4	Temperature	1-2-3-7	-	-200	64
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	°C	1001	65
40	ElectronicTemp	23	17	VALUE	1	r	Float32	4	PCB temperature	1-2-1-10	-	39,1	66
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	°C	1001	67
41	PowerElectronicTemp	24	17	VALUE	1	r	Float32	4	Heat sink temperature	1-2-1-9	-	33,9	68
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	°C	1001	69
48	Power	25	17	VALUE	1	r	Float32	4	Motor input power	1-2-1-2	-	0	70
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	kW	1190	71
50	MotorCurrent	26	17	VALUE	1	r	Float32	4	Motor current	1-2-1-5	-	0	72
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	A	1209	73
53	MotorVoltage	27	17	VALUE	1	r	Float32	4	Motor voltage	1-2-1-6	-	0	74
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	V	1240	75
54	DCLinkVoltage	28	17	VALUE	1	r	Float32	4	DC link voltage	1-2-1-8	-	542	76
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	V	1240	77

ID functional element	Functional element	Slot	Index	Parameter name	Rel Index	Access (r: read, w: write)	Data type	Size [byte]	Description	KSB menu number	Value range	Value (example)	Parameter index
56	Energy	29	17	VALUE	1	r	Float32	4	Energy meter (kWh)	1-4-1-1	-	0	78
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	kWh	1179	79
60	OperationTime	30	17	VALUE	1	r	Float32	4	Pump operating hours	1-4-2-3	-	555	80
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	h	1059	81
61	TotalPoweredTime	31	17	VALUE	1	r	Float32	4	Frequency inverter operating hours	1-4-2-1	-	1965	82
			18	VALUE_UNIT	2	r	Unsigned16	2	-	-	h	1059	83
65	Motor	32	19	VOLTAGE	3	r	Float32	4	Nominal motor voltage	3-2-1-2	Motor name plate 0..480 V	400	84
			21	CURRENT	5	r	Float32	4	Nominal motor current	3-2-1-4	Motor name plate 0..150 A	2,6	85
			23	POWER	7	r	Float32	4	Nominal motor power	3-2-1-1	Motor name plate 0..55 kW	7	86
			25	FREQUENCY	9	r	Float32	4	Nominal motor frequency	3-2-1-3	Motor name plate 0..100 Hz	50	87
			28	ROTOR_SPEED	12	r	Float32	4	Nominal motor speed	3-2-1-5	Motor name plate 0..4200 rpm	1500	88
			29	MAX_ROTOR_SPEED	13	r	Float32	4	Maximum motor speed	3-2-2-2	Motor name plate 0..4200 rpm	1500	89
66	Converter	33	19	SUPPLY_VOLTAGE_HIGH	3	r	Float32	4	Maximum nominal voltage	-	Technical data PumpDrive 2 480 V	480	90
			20	SUPPLY_VOLTAGE_LOW	4	r	Float32	4	Minimum mains voltage	-	Technical data PumpDrive 2 380 V	380	91
			22	SUPPLY_FREQUENCY_HIGH	6	r	Float32	4	Maximum mains frequency	-	Technical data PumpDrive 2 60 Hz	60	92
			23	SUPPLY_FREQUENCY_LOW	7	r	Float32	4	Minimum mains frequency	-	Technical data PumpDrive 2 50 Hz	50	93

ID functional element	Functional element	Slot	Index	Parameter name	Rel Index	Access (r: read, w: write)	Data type	Size [byte]	Description	KSB menu number	Value range	Value (example)	Parameter index
66	Converter	33	25	TEMP_HIGH	9	r	Float32	4	Maximum in-service ambient temperature	-	Technical data PumpDrive 2 50 °C	50	94
			26	TEMP_LOW	10	r	Float32	4	Minimum in-service ambient temperature	-	Technical data PumpDrive 2 -10 °C	-10	95
			28	VOLTAGE_MAX	12	r	Float32	4	Maximum rated voltage	-	Name plate PumpDrive 2 400 V	400	96
			29	CURRENT_MAX	13	r	Float32	4	Maximum rated current	-	Name plate PumpDrive 2 20..120 A	2,6	97
			31	POWER_MAX	15	r	Float32	4	Maximum rated power	-	Name plate PumpDrive 2 0..55 kW	7	98
			33	FREQUENCY_HIGH	17	r	Float32	4	Maximum output frequency	-	140 Hz: KSB SuPremE motor 70 Hz: Other	70	99
			34	FREQUENCY_LOW	18	r	Float32	4	Minimum output frequency	-	0 Hz	0	100

1.7.2 Definition of the "rotodynamic pump" module available in the cyclic data exchange

The Rotodynamic Pump module serves to enter setpoints and control values for the pump set in a compact form. It also provides key information on the current operating status.

A variety of data types is used within the address range of the module. Binary information and requests in the module are bit-coded; the other data points are transmitted as integer values.

The Rotodynamic Pump module is the most important data point for control of the frequency inverter and is structured as follows:

- Rotodynamic Pump Input = 6 Byte (Byte, Byte, Word, Byte Byte)
- Rotodynamic Pump Output = 5 Byte (Byte, Byte, Byte, Word)

NOTE

Depending on the make of PLC, pay special attention to the area of the memory into which the Rotodynamic Pump module must be integrated.

Consistency on the part of the Rotodynamic Pump module can only be ensured if the module is located in the process image area or if the module is copied into or out of a buffered area by special system modules. The Rotodynamic Pump module contains bit variables, byte variables and word variables. This does not apply to the process variable view. A process image is not required as byte operations, word operations or double-word operations are provided there which ensure the module's consistency.

Table 8: Rotodynamic Pump module, input

Offset byte. Bit	Data type	Parameter name	Functional element	Description	Unit
0.7	BOOL	AT_MIN_SPEED	PumpSpeedMin.VALUE	1: Pump running at minimum speed	-
0.6	BOOL	STANDBY	StandBy.VALUE	1: Pump ready for start-up	-
0.5	BOOL	AT_MAX_SPEED	PumpSpeedMax.VALUE	1: Pump running at maximum speed	-
0.4	BOOL	PUMP_ACTIVE	PumpActivation.VALUE	1: Automatic mode activated (AUTO is displayed)	-
0.3	BOOL	WARNING	-	1: Active warning	-
0.2	BOOL	FAULT	-	1: Active pump alert or system alert	-
0.1	BOOL	ON_OFF	GenericPump.ON_OFF	1: Pump is ON	-
0.0	BOOL	ACCESS_MODE	GenericPump.ACCESS_MODE	1: Bus control is enabled	-
1.7	BOOL	DIRECTION	-	Not supported	-
1.6	BOOL	ROTATION	-	Not supported	-
1.5	BOOL	AT_MAX_POWER	-	Not supported	-
1.4	BOOL	SETPOINT_INFLUENCE	-	Not supported	-
2	INT	PROCESS_FEEDBACK	PumpActuation.FEEDBACK	Actual value of the active process variable (see CB_CONTROL_MODE)	0,01 %
4	BYTE	CB_CONTROL_MODE	PumpActuation.CB_CONTROL_MODE	128: Off Control system OFF, fixed speed operation	-
				129: Discharge pressure	-
				130: Suction pressure	-
				131: Differential pressure	-

Offset byte. Bit	Data type	Parameter name	Functional element	Description	Unit
4	BYTE	CB_CONTROL_MODE	PumpActuation.CB_CONTROL_MODE	132: Differential pressure (sensorless)	-
				133: Flow rate	-
				134: Flow rate (sensorless)	-
				135: Temperature (cooling)	-
				136: Temperature (heating)	-
				137: Suction-side level	-
				138: Discharge-side level	-
5	BYTE	CB_OPERATION_MODE	PumpActuation.CB_OPERATION_MODE	128: Off (display: OFF)	-
				129: Manual mode (display: MAN)	
				130: Automatic mode (display: AUTO)	

Table 9: Rotodynamic Pump module, output

Offset Byte.Bit	Data type	Parameter name	Functional element	Description	Unit
0.7	BOOL	PUMP_KICK_REQ	PumpKick.VALUE	0 => 1 starts a functional check run	-
0.4	BOOL	REMOTE_OPERATION	-	Not supported	-
0.3	BOOL	DIRECTION_REQ	-	Not supported	-
0.2	BOOL	RESET_FAULT	GenericPump.RESET_FAULT	0 => 1 acknowledges warnings and alerts and clears the fault	-
0.1	BOOL	ON_OFF_REQ	GenericPump.ON_OFF	1: Pump ON	-
0.0	BOOL	REMOTE_ACCESS_REQUEST	GenericPump.REMOTE_ACCESS_REQUEST	-	-
1	BYTE	CONTROL_MODE	PumpActuation.CONTROL_MODE	128: OFF (control system OFF, fixed speed operation)	-
				129: Discharge pressure	-
				130: Suction pressure	-
				131: Differential pressure	-
				132: Differential pressure (sensorless)	-
				133: Flow rate	-
				134: Flow rate (sensorless)	-
				135: Temperature (cooling)	-
				136: Temperature (heating)	-
				137: Suction-side level	-
				138: Discharge-side level	-
2	BYTE	OPERATION_MODE	PumpActuation.OPERATION_MODE	Request of operating mode: 128: Off	-
				129: Manual mode	-
				130: Automatic mode	-
3	INT16	SETPOINT	PumpActuation.SETPOINT	Setpoint of the corresponding type of control (CB_CONTROL_MODE). The value range corresponds to that of the process value (actual value).	0,01 %

NOTE

In order for the PLC to be able to write data from the “Rotodynamic Pump, Output” area to the frequency inverter, it must be ensured that “Remote Request Access” is set. This bit can remain permanently set. The data can only be written when “Bit 0 - Access Mode” is confirmed at the PLC. This bit is flank-controlled and must therefore be set again after, for example, a power failure. This likewise applies to the bytes “Byte 1 - Control Mode” and “Byte 2 - Operation Mode”.

1.7.3 Definition of the feedback module available in the cyclic data exchange

The feedback module is required for transmitting an actual value for the closed-loop control of PumpDrive 2 via field bus. In this case process control is effected by PumpDrive 2.

Table 10: Feedback module, output

Module designation	Data type	Description	Menu	Unit	Functional element
Feedback/ VALUE	INT	Actual value (closed-loop control)	1-2-3-1	0,01 %	Feedback.VALUE

1.7.4 Definition of the modules for reading out process values available in the cyclic data exchange

Each process value is represented by the corresponding module. All process values are of the REAL data type.

Table 11: Process value modules, input

Module designation	Data type	Description	Menu	Unit	Functional element
DiffPressure/VALUE	REAL	Process value differential pressure	1-2-3-4	bar	DiffPressure.VALUE
FlowVelocity/VALUE	REAL	Flow velocity	1-2-3-8	m/s	FlowVelocity.VALUE
Frequency/VALUE	REAL	Output frequency	1-2-1-7	Hz	Frequency.VALUE
Head/VALUE	REAL	Head	1-2-3-9	m/s	Head.VALUE
InletPressure/VALUE	REAL	Suction pressure	1-2-3-2	bar	InletPressure.VALUE
Level/VALUE	REAL	Fill level	1-2-3-6	m/s	Level.VALUE
MotorVoltage/VALUE	REAL	Motor voltage	1-2-1-6	V	MotorVoltage.VALUE
OutletPressure/VALUE	REAL	Discharge pressure	1-2-3-3	bar	OutletPressure.VALUE
Power/VALUE	REAL	Motor input power	1-2-1-2	kW	Power.VALUE
PowerElectronicTemp/ VALUE	REAL	Heat sink temperature	1-2-1-9	°C	PowerElectronicTemp.VALUE
PumpLiquidTemp/VALUE	REAL	Temperature	1-2-3-7	°C	PumpLiquidTemp.VALUE
Speed/VALUE	REAL	Speed	1-2-1-1	rpm	Speed.VALUE
Torque/Value	REAL	Motor torque	1-2-1-11	Nm	Torque.Value
VolumeFlow/VALUE	REAL	Flow rate	1-2-3-5	m^3/h	VolumeFlow.VALUE
MotorCurrent/VALUE	REAL	Motor current	1-2-1-5	A	MotorCurrent.VALUE

1.7.5 Contents of the diagnosis modules available in the cyclic data exchange

Description of the diagnosis parameters supported in the PumpDrive 2 Profibus implementation by the corresponding messages.

Table 12: Module PB/DIAGNOSIS (PhysicalBlock.DIAGNOSIS), input

Offset byte. Bit	Data type	Error code	Parameter name	Comments	PumpDrive 2 message
0.0-0.7	BOOL	0x9000-0x9007	-	Reserved by PI, fixed at 0	-
1.0-1.2	BOOL	0x9008-0x900A	-	Reserved by PI, fixed at 0	-
1.3	BOOL	0x900B	DIA_WARMSTART	Reserved by PI, not a PIP component, fixed at 0	-
1.4	BOOL	0x900C	DIA_COLDSTART	Reserved by PI, not a PIP component, fixed at 0	-
1.5	BOOL	0x900D	DIA_MAINTENANCE	1: Active maintenance interval of the pump	I100
1.6	BOOL	0x900E	-	Reserved by PI, fixed at 0	-
1.7-2.3	BOOL	0x900F-0x9013	IDENT_NUMBER_VIOLATION	Not supported	-
2.4-2.7	BOOL	0x9014-0x9017	-	Reserved by PI, fixed at 0	-
3.0	BOOL	0x9018	DIA_HARDWARE	Hardware diagnosis event	-
3.1	BOOL	0x9019	DIA_SOFTWARE	Software diagnosis event	-
3.2	BOOL	0x901A	DIA_MECHANICS	Mechanics diagnosis event	-
3.3	BOOL	0x901B	DIA_ELETRICS	Electrics diagnosis event	-
3.4	BOOL	0x901C	DIA_PROCESS	Process diagnosis event	-
3.5	BOOL	0x901D	DIA_OPERATION	Operation diagnosis event	-

Offset byte. Bit	Data type	Error code	Parameter name	Comments	PumpDrive 2 message
3.6	BOOL	0x901E	DIA_AUX_DEVICE	Auxiliary equipment diagnosis event	-
3.7	BOOL	0x901F	EXTENSION_AVAILABLE	1: Further error details are available in the extended diagnosis.	-

Table 13: Module PB/DIAGNOSIS_EXT_HARDWARE (PhysicalBlock.DIAGNOSIS_EXT_HARDWARE), input

Offset byte. Bit	Data type	Error code	Parameter name	Comments	PumpDrive 2 message
0.0	BOOL	0x9101	HardwareFault	1: Hardware fault	A6
0.1	BOOL	0x9102	PowerSupply	1: Power supply fault	A21
0.2	BOOL	0x9103	DCLinkSupply	1: Undervoltage 24 V DC supply	A22
0.3-1.3	BOOL	0x9104-0x910C	-	Not supported	-
1.4-1.6	BOOL	0x9000, 0x910D-0x917F	-	Reserved by PI, fixed at 0	-
1.7	BOOL	0x9180-0x9182	Make-specific	HMI hardware test not passed	A98
				IO hardware test not passed	A99
				24 V overload	W76

Table 14: Module PB/DIAGNOSIS_EXT_SOFTWARE (PhysicalBlock.DIAGNOSIS_EXT_SOFTWARE), input

Offset byte. Bit	Data type	Error code	Parameter name	Comments	PumpDrive 2 message
0.0-0.7	BOOL	0x9201-0x9208	Software Fault	Not supported	-
1.0-1.6	BOOL	0x9200, 0x920A-0x927F	-	Reserved by PI, fixed at 0	-
1.7	BOOL	0x9280-0x9285	Make-specific	Firmware update required	A12
				No matching motor data available	A18
				No motor data available	A19
				Firmware update for field bus required	W78
				Firmware update for HMI required	W79
				General settings loaded	W99

Table 15: Module PB/DIAGNOSIS_EXT_MECHANICS (PhysicalBlock.DIAGNOSIS_EXT_MECHANICS), input

Offset byte. Bit	Data type	Error code	Parameter name	Comments	PumpDrive 2 message
0.0-1.5	BOOL	0x9301-0x930E	-	Not supported	-
1.6	BOOL	0x930F	BrakeChopper	Braking resistor	-
1.7	BOOL	0x9310	-	Not supported	-
2.0-2.6	BOOL	0x9300, 0x9311-0x937F	-	Reserved by PI, fixed at 0	-
2.7	BOOL	0x9380-0x93FF	-	Not supported	-

Table 16: Module PB/DIAGNOSIS_EXT_ELECTRICS (PhysicalBlock.DIAGNOSIS_EXT_ELECTRICS), input

Offset byte. Bit	Data type	Error code	Parameter name	Comments	PumpDrive 2 message
0.0	BOOL	0x9401	ElectricalFault	Not supported	-
0.1	BOOL	0x9402	InstallationFault	Not supported	-
0.2	BOOL	0x9403	SupplyVoltage	Phase failure, mains side	A23
0.3	BOOL	0x9404	SupplyVoltHigh	Overvoltage	A2, W51
0.4	BOOL	0x9405	SupplyVoltLow	Undervoltage	A3, W52
0.5	BOOL	0x9406	SupplyCurrent	Not supported	-
0.6	BOOL	0x9407	SupplyCurrHigh	Current high	W61
0.7	BOOL	0x9408	SupplyCurrLow	Current low	W62
1.0	BOOL	0x9409	SupplyFrequency	Not supported	-
1.1	BOOL	0x940A	SupplyFreqHigh	Frequency high	W71
1.2	BOOL	0x940B	SupplyFreqLow	Frequency low	W72
1.3	BOOL	0x940C	PhaseFailure	Phase failure, motor side	A4
1.4	BOOL	0x940D	VoltageInDevice	Not supported	-
1.5	BOOL	0x940E	CurrentInDevice	Overcurrent	A9
1.6	BOOL	0x940F	ShortToEarth	Not supported	-
1.7	BOOL	0x9410	ShortCircuit	Short circuit	A5
2.0	BOOL	0x9411	WindingTemp	Not supported	-
2.1	BOOL	0x9412	InsulationResist	Not supported	-
2.2	BOOL	0x9413	FieldCircuit	Not supported	-
2.3	BOOL	0x9414	ArmatureCircuit	Not supported	-
2.4-2.6	BOOL	0x9400, 0x9415-0x947F	-	Reserved by PI, fixed at 0	-
2.7	BOOL	0x9480-0x9485	Make-specific	Dynamic overload protection	A11, W50
				AMA fault	A20
				Power high	W73
				Power low	W74
				Limited stop ramp	W75
				Drive disabled	I101

Table 17: PB/DIAGNOSIS_EXT_PROC_LIQUID (PhysicalBlock.DIAGNOSIS_EXT_LIQUID), input

Offset byte. Bit	Data type	Error code	Parameter name	Comments	PumpDrive 2 message
0.0-0.2	BOOL	0x9501-0x9503	-	Not supported	-
0.3	BOOL	0x9504	Dry	Dry running	A13
0.4	BOOL	0x9505	Blockage	Hydraulic blockage	A15, W56
0.5-1.2	BOOL	0x9507-0x950B	-	Not supported	-
1.3-1.6	BOOL	0x9500, 0x950C-0x957F	-	Reserved by PI, fixed at 0	-
1.7	BOOL	0x9580-0x9581	Make-specific	Dry running (external)	A14
				Lack of water	A17

Table 18: PB/DIAGNOSIS_EXT_OPERATION (PhysicalBlock.DIAGNOSIS_EXT_OPERATION), input

Offset byte. Bit	Data type	Error code	Parameter name	Comments	PumpDrive 2 message
0.0-3.0	BOOL	0x9701-0x9719	-	Not supported	-
3.1	BOOL	0x971A	OverLoad	Overload	W58
3.2	BOOL	0x971B	PartialLoad	Part load	W57
3.3-4.0	BOOL	0x971C-0x9721	-	Not supported	-
4.1	BOOL	0x9722	DriveOverheat	Heat sink temperature high	A7, W59
4.2	BOOL	0x9723	MotorOverheat	Thermal motor protection	A1
4.3	BOOL	0x9724	ContrOverheat	PCB temperature high	A8, W60
4.4	BOOL	0x9725	-	Not supported	-
4.5-4.6	BOOL	0x9700, 0x9726-0x977F	-	Reserved by PI, fixed at 0	-
4.7	BOOL	0x9780-0x978F	Make-specific	No master control	A16
				External message	A30, W30
				Resonance range	W53
				Actual value failure	W55
				Speed monitoring	W63
				Setpoint monitoring	W64
				Actual value monitoring	W65
				Flow rate monitoring	W66
				Suction pressure monitoring	W67
				Discharge pressure monitoring	W68
				Differential pressure monitoring	W69
				Temperature monitoring	W70
				Low flow velocity	W80
				Pipe flushing mode active	I102
				Pipe filling mode active	I103
				Overflow	W83

Table 19: PB/DIAGNOSIS_EXT_AUX_DEVICE (PhysicalBlock.DIAGNOSIS_EXT_AUX_DEVICE), input

Offset byte. Bit	Data type	Error code	Parameter name	Comments	PumpDrive 2 message
0.0	BOOL	0x9A01	AuxDeviceFault	Not supported	-
0.1	BOOL	0x9A02	SensorElement	Broken wire	W54
0.2-4.2	BOOL	0x9A03-0x9A23	-	Not supported	-
4.3	BOOL	0x9A24	-	Not defined	-
4.4-4.6	BOOL	0x9A00, 0x9A25-0x9A7F	-	Reserved by PI, fixed at 0	-
4.7	BOOL	0x9A80, 0x9A81	Make-specific	PumpMeter communication	W77

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